U.S. Naval Academy
Mechanical Engineering Department
EM320 - Applied Thermodynamics
Spring 2005

07 January 2005

FROM: EM320 Course Director
TO: EM320 ALL SECTIONS

SUBJ: COURSE OBJECTIVE AND POLICY - EM320

REF: (a) USNA Catalog 2004-05
(b) MECHENGRDEPT INST 1531.16D

INSTRUCTORS:

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COURSE OBJECTIVES:

The following objectives have been set for EM320:

(1) To give the student practical examples of applications of vapor and gas power cycles for power generation and propulsion.
(2) To introduce the student to compressible flow, refrigeration cycles, air conditioning, psychrometrics, and combustion.
(3) To provide the student with exposure to physical devices which operate based on principles of thermodynamics and fluid dynamics through field trips and laboratory experiments.
(4) To provide the student with design experience through open ended problems involving practical thermodynamics systems and engineering economics.
(5) To provide the student with experience in reporting experimental results and the results of design exercises.

TEXT: *Thermodynamics An Engineering Approach, 4th ed.* (Cengel and Boles)

COURSE POLICIES:

General Policies:

(1) In keeping with professional engineering practice, all outside sources of information used for any work submitted in this course must be cited. "Outside sources" include all sources other than your text, course notes, and current EM320 instructor.
(2) Students are responsible for all assigned material as well as for information conveyed in class and via handouts and email.

Homework Policies:

(1) Homework should be submitted in a clear, neat manner.
(2) Collaboration with classmates in preparing homework is encouraged. However, each student must submit each assignment. Copying of homework is not acceptable.
(3) When solving a homework problem, begin by stating what is known and what is to be found. Explicitly state all assumptions as they are made. Draw a sketch of the system. Include figures, graphs, and sketches whenever they are useful to explain the solution. In general, follow the procedure used for solving example problems in class.
(4) You may use computer programs such as EES to solve homework problems. Whether solving with the computer or by hand, always show your work in a clear and logical manner.

Test/Quiz Policies:

(1) Three exams will be given during the semester. The exam dates are provided on the Assignment Sheet. You MUST request permission IN ADVANCE for excusal from a scheduled exam.
(2) You are allowed to use one 8-1/2" x 11" sheet of paper for equations and the tables and inside cover of the text during exams. The equation sheet may not include worked problems.
(3) Calculators, books, etc. **may not** be shared during exams.
(4) Additional quizzes (in class or take-home) may be assigned by your instructor.

Labs/Design Problems:

(1) Laboratory assignments will be split between physical experiments and design problems.
(2) The presentation of results for the labs and designs will be discussed in class. Memorandum Report format, as used in EM375, will be used for most.
(3) Oral and/or written presentation of projects and labs must be professional.
(4) All references used in project and lab preparation must be clearly cited.
(5) Solutions will be facilitated with the computer program EES, which will be introduced in class.

GRADING: Your grade for this course will be calculated as follows:

Tests	40%
Labs/Designs	20%
Homework, quizzes, instructor input	10%
Final exam	30%

R.J. Volino
Assoc. Prof.
Course Director

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ASSIGNMENTS

All reading and homework assignments refer to Cengel and Boles, unless otherwise noted. The reading assignment should be completed **prior** to class on the date listed. Homework for each week is due on the Wednesday following the day it was assigned (e.g. problems assigned Jan 10, 12 and 13 are all due on Jan. 19). Homework submitted after the due date will receive at most half credit and will be accepted at the discretion of you instructor.

DATE		READING ASSIGNMENT	HOMEWORK
Jan 07	F	Gas Mixtures (12.1-12.2)	12.32, 12.36, 12.37
10	M	Gas Mixtures (12.2-12.3)	12.49, 12.53, 12.57
12	W	Gas Mixtures (12.3)	14.15, 14.18, 14.24
13	Th	Combustion- Reactions, 1st law (14.1-14.4)	14.49E, 14.52
17	M	HOLIDAY	------
19	W	Adiabatic Flame Temperature (14.5)	14.67E, 14.69
20	Th	EES Intro/Otto Cycle/Design 1 (8.4-8.5)	Handout
24	M	Diesel Cycle	8.47E, 8.52
26	W	Uncertainty/EES	Handout
27	Th	IC Engine Lab	Handout
31	M	Brayton Cycle, Regeneration (8.8-8.9)	8.69E, 8.75, 8.86E
Feb 02	W	Brayton Reheat/Intercool (8.10)	8.87, 8.105
03	Th	CFR Engine Lab	Handout
Feb 07	M	Aircraft Propulsion Cycles (8.11)	8.112E, 8.115
09	W	Catch up	------
10	Th	**EXAM #1**	------
14	M	Compressible Flow (16.1-16.3)	16.5, 16.20, 16.37
16	W	Nozzles and Diffusers (16.4)	16.58, 16.63, 16.67E
17	Th	Gas Turbine Lab	Handout
21	M	HOLIDAY	------
23	W	Shock Waves	16.73, 16.75
24	Th	NAVSEA Trip	------

DATE		READING ASSIGNMENT	HOMEWORK
28	M	Engineering Economics – Handout	Handout
Mar 02	W	Engineering Economics – Handout	Handout
03	Th	Rankine Cycle (9.2-9.3)/Design 2	Handout
07	M	Reheat (9.4-9.5)	9.17, 9.20, 9.29
09	W	Catch up	------
10	Th	**EXAM #2**	------
14	M	**SPRING BREAK**	
16	W	**SPRING BREAK**	
17	Th	**SPRING BREAK**	
21	M	Regeneration/OFWH (9.6)	9.31E (use T_{cond}=55F), 9.38
23	W	Regeneration/CFWH/Cogeneration (9.8)	9.39, 9.86, 9.59E
24	Th	Power Plant Trip	------
28	M	Vapor Compression Refrigeration (10.1-10.4)	10.11, 10.28E
30	W	Refrigerants (10.5-10.6)	10.19, 10.24
31	Th	Refrigeration Lab	Handout
Apr 04	M	Advanced Cycles (10.7)	10.40
06	W	Gas Refrigeration (10.8)	10.52E, 10.55
07	Th	Design 3	Handout
11	M	Psychrometrics (13.1-13.3)	13.16, 13.26, 13.33E
13	W	Catch up	------
14	Th	**EXAM #3**	------
18	M	Adiabatic Saturation/Psych. Chart (13.4-13.5)	13.42E, 13.43E, 13.44
20	W	Air Conditioning (13.6-13.7)	13.67E, 13.73, 13.77
21	Th	Adiab. Mixing (13.7)/Design 3	13.88E, 13.93, 13.98E
25	M	Evaporative Cooling	------
27	W	Cooling Towers (13.7)	13.104
28	Th	Catch up – Review	------